Chapter 4

Economic Openness and Trade Linkages of China: An empirical study of the determinants of Chinese trade intensities from 1993 to 1999

The Chinese economy is on the move. In the 1980s, the Chinese regime took a number of piecemeal steps toward economic liberalization. This process accelerated impressively in the 1990s. This chapter reports an empirical study into the determinants of the emerging pattern of Chinese trade (export and import) intensities in the liberalization decade by exploring international trade statistics for 1993 to 1999. That is, six models are estimated that seek to explain the shifts in the export and import intensities of trade with different trade partners in the 1993-1999 period. The estimation results reveal striking differences for export vis-à-vis *import trade intensities, as well as for 1993 versus 1999. For example, a key result is that the political determinants of trade intensities that were still very important in 1993, have been moved to the background by economic explanations in 1999. Clearly, China is opening up to the world at large, de-emphasizing political preferences in the economic trade arena.*

4.1 Introduction

Since the launch of a market-oriented reform program in 1978, Chinese international trade has experienced an extraordinary expansion with an 18 per cent average annual

growth rate.[1] Nowadays, Chinese export and import play a non-negligible role in worldwide international economic activities. In 1999, China became the ninth largest trader in the world.[2] In 2001, entry into the World Trade Organization (WTO) was finally established. Without any doubt, China moves rapidly to join the global economy, contributing to the growing integration of global business more substantially than ever before in the communist era. During the transition from a closed to an open economy, the market mechanism started to function in Chinese society, which inevitably involved intensifying bilateral trade linkages with many countries. Not surprisingly, given the huge potential of China's billion-plus population, a substantial body of literature has emerged that is concerned with Chinese trade issues. However, among this rapidly expanding stock of studies, there is little analysis of the dynamics of Chinese trade linkages with trade partners. For sure, there are many studies that focus on the bilateral trade linkage between China on the one hand and a specific trade partner such as East Asia, Japan or the US on the other hand (e.g., Platte 1991; Wu and Zhang 1998; Loungani 2000). However, few studies aim at understanding the distribution of Chinese export and import over all trade partners so as to unravel the factors that explain the (shifts in) Chinese trade intensities. The purpose of the current study is to fill this gap by answering three questions: How have Chinese bilateral trade linkages developed in the 1990s?; What factors may explain the distribution of Chinese trade over different countries in the 1990s?; and How has the (relative and absolute) importance of these factors changed during the transition period of the 1990s?

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[1] Source: World Bank 2000 Yearbook.

[2] The Chinese Ministry of Foreign Trade and Economic Cooperation (MOFTEC).

In the international trade linkages literature, an important approach is the gravity model, which involves the identification of variables that determine the size of trade flows between countries, in so doing analyzing the relative importance of different trade-driving forces. Introduced by Tinbergen (1962), the gravity model has been successfully applied to bilateral trade flows, usually producing a good estimation fit (Anderson 1979). This model emphasizes the explanation of the absolute size of bilateral trade flows (e.g., Bergstrand 1989 & 1990; Rauch and Trindade 2002). In this chapter, we employ the trade intensity index, which reformulates the gravity model such that the relative intensity of the bilateral trade linkages across different trade partners is explicitly measured. In most cases, after all, a large bilateral trade volume does not imply a similarly close trade relationship. For example, the export value from China to the United States is ranked first among the Chinese trade partners in 1999 (MOFTEC), but the trade linkage between these two counties is not necessarily the most intensive one, given the huge aggregate import value of the United States. The empirical study reported below reveals that the mere volume of a trade flow from country y to x alone is not enough to unravel the relative importance of this trade linkage for country y or x completely.

In contrast to the trade volume measure, the trade intensity index is an explicit measure of the relative importance of the trade linkage between two countries (e.g., Chow 1999; Foroutan 1998; Greytak and Tuchinda 1990; Peh 1999). Using this trade intensity index, for both export and import, this chapter identifies the factors that affect the intensity of the trade linkages between China and a large set of different trade partners. Using trade intensity indices to measure trade linkages has a twofold advantage. First, the trade intensity index normalizes many factors that may affect the absolute trade flows, such as the countries' international openness, exchange rate

and price level. Since these country-specific factors have equal impact on the bilateral trade flows of this country with all its trade partners, these factors affect the aggregate trade volume but not the across-partners trade structure of this country. Second, and related to the above, the trade intensity index is an indicator that reveals the relative importance of the trade relationship between two counties explicitly. A trade intensity index with country y larger than one implies that the relative importance of that trade linkage with this partner y is above average.

Another theoretical model that targets the explanation of trade flows is Linder's theory (Linder 1961). The departure point of Linder's approach is that an important source of production and trade is domestic demand. From that perspective, Linder concludes that the closer trade partners are in their demand patterns to focal country y, the more similar will be their trade commodities composition and the larger will be their volume of bilateral trade. In other words, patterns and intensities of international trade are determined by similarities in the level of development, and so by convergence of domestic consumption patterns. Specifically, the Linder effect refers to the impact of income level similarity on how a country distributes international trade across foreign partners. Because most finished and many intermediate goods are produced in and traded from developed countries, a long list of empirical studies have reported strong evidence for the existence of a Linder effect among developed countries, but very weak or no evidence for less developed countries (LDCs) (e.g., Hufbauer 1970; Greytak and McHugh 1977; Ahmad and Simos 1979; Thursby and Thursby 1987; Shelburne 1987; Linnemann and van Beers 1988; Hanink, 1990). In the 1980s and 1990s, however, along with rapid economic transformation in a number of developing countries, signs of a positive Linder effect were also found for intra-LDC trade (Weinblatt and Schrager 1985; Arnon and Weinblatt 1998). The current study employs gross domestic product per capita,

education expenditures and industry structure measures to test for a Linder effect in the context of Chinese trade.

Overall, the contribution of this chapter to the study of bilateral trade linkages is fivefold. First, the examples of the gravity model and the Linder effect illustrate the need to adopt an integrative perspective, taking on board a large set of explanatory variables from different theoretical perspectives. This chapter introduces gravity and Linderian variables in a trade intensity estimation model. On top of that, this study adds additional variables to the explanatory model, such as foreign direct investment and the size of the Chinese immigrant population in the trade partners' societies. Second, instead of the mere volume of trade flows, this study introduces the trade intensity index to measure the relative weight of a set of trade linkages, which explicitly reveals the relative importance of trade between two countries.[3] Third, the current study involves China and 71 major trade partners, which – as far as we know – is much more than any former study, to date, has done. Fourth, regressions are run for export and import trade intensities separately, allowing us to explore whether or not the across-countries distribution of Chinese export and import flows are driven by similar or dissimilar forces. Fifth, this study tries to unravel the impact of the recent Chinese trade liberalization program on bilateral trade linkages by estimating

[3] Doing it all in a single chapter would be too much, as we already have to report an interpretation of a multi-way comparison of the findings for the whole time window, two milestone years and two intensity measures. The results of similar analyses for absolute trade flows, rather than relative trade intensities, are available upon request, however.

trade intensity models for the 1993-1999 period, as well as for the 1993 and 1999 milestone years separately.

4.2 Trade Reforms and Trade Partners

4.2.1 Trade reforms

Starting in 1978, China has introduced a series of opening policies toward foreign trade and investment. Roughly speaking, Chinese trade liberalization history can be divided into two stages. The first stage ranges from 1978 to 1992. During that period, the policy as to the transition toward a market-oriented system followed a gradual step-by-step approach. In this period, the opening process started with the establishment of a few special economic zones, targeting specific industries only. In terms of the trade administration system, decentralization was introduced at three levels. First, rights and responsibilities were passed from the central government to local authorities, with the aim to encourage local state-owned trading companies to develop international trade linkages (Rauch 2001). Second, a contracting-out and management-responsibility system was launched, which gave more decision-making power to trading companies. Third, trading companies were allowed to retain part of the foreign exchange they earned, so enabling them to profit from their trading activities and to operate in the foreign exchange market. Fourth, in the 1986-1991 period China decreased the import tariff rates for a small group of commodities. That is, the tariff rates for 81 (from about 6,300 duty codes, in total) were lowered by 30 to 85 per cent (Tariff Policy Commission of the State Council of China 1991). All these reforms together put an end to the era of Chinese 'splendid isolation', hence triggering the emergence of Chinese international trade. However, the reforms in this period were not sufficient to change much because the trade system suffered from disorder and even chaos, as conflicts between regions and among different levels of

authorities raised to trade-impeding degrees. The result was that much confusion and inefficiency were produced by this mixture of centralized regulation and decentralized administration.

A new stage of Chinese economic reform began in 1992. Since then, the Chinese trade system has been adapted to better reflect international norms, and the process of trade liberalization has accelerated, through five routes. First, the Chinese government lowered trade tariff rates more broadly and more significantly. In January and again in December 1992, China reduced import tariffs for 3,596 duty codes, reflecting different product categories, by an average of 7.3 per cent. In the same year, China eliminated an adjustment tax that had been levied since 1985 on the import of 16 categories of goods. In December 1993, China further cut back on import tariff rates for 2,898 duty codes by an average of 8.8 per cent. In January 1994, import tariff rates for sedans were reduced from 220 per cent and 180 per cent (depending on the model) to 150 per cent and 110 per cent, respectively. In April 1996, import tariffs for 4,971 items were lowered by an average of 35 per cent, reducing the country's average tariff rate from 35 to 23 per cent for all goods. The average rate was further decreased to 17 per cent on October 1 1997 (Customs of the People's Republic of China). In 2001, China cut import tariff rates on 3,462 items by an average of 6.6 per cent, bringing the country's average tariff rate down to 15.3 percent (*China Daily* of May 1 2001). In all, the trade liberalization program during the post-1992 period is associated with a drop of the arithmetic average of tariff rates from 43.2 per cent in 1992 to 15.3 percent in 2001.

Second, non-tariff trade barriers were reduced substantially, or even demolished altogether. In 1992, the government lowered the number of export goods subject to quota license regulation from 212 to 183, and fully eliminated import-quota license

requirements for 16 categories of goods. In December 1993, China canceled import license requirements for 9 categories of goods that comprise 283 products, including steel products, pesticides, civil airplanes, and black-and-white television tubes. In May 1994, China eliminated import license requirements for another 195 goods, including 30 goods that were to be relieved of requirements by the end of 1994 in accordance with a Sino-US memorandum of understanding. In 1995, another 120 goods were relieved of import license regulation. In April 1996, 30 per cent of the remaining quotas were dropped. In addition, 1994 was the last year in which the government issued mandatory instructional plans for export and import trade. The mandatory plans were compulsory and restrictive, being based on strict centrally-controlled foreign exchange regulation.

Third, the government started a program of administrative reforms by (a) developing an adapted trade-related regulatory and international law system and (b) making the international trade administration system much more transparent. The "Law of Foreign Trade of the People's Republic of China" was promulgated in May 1994, and entered into effect only two months later. Several regulatory measures that are associated with this new law are currently under review, including "Regulations for Import Goods", "Regulations for Export goods", "Anti-Dumping Statute", "Anti-Subsidy Statute", "Safeguard Regulations", "Regulations for Punishing Low-Price Exports", and "Regulations for Responding to Anti-Dumping Suits against China's Exports". All these administrative reforms will further smooth the process of international trade by bringing Chinese practice more in line with international standards.

Fourth, along with the liberalization of the international trade system, the reform program has been extended to services industries and foreign direct investment (FDI). Since 1992, additional industries, including a number of sensitive industries in

the services sector, were gradually liberalized to allow for entry by foreign firms. On top of this, more geographical areas were opened for foreign direct investment, including inland cities, which provided foreign investors much better access to the domestic interior market of mainland China. In addition, FDI-related reforms were speeded up, such as a tax relaxation. This set of FDI-directed reforms greatly improved China's investment environment, so promoting China's international trade position. So, the liberalization of services industries in combination with FDI-stimulating measures has introduced a further impetus to the development of international trade.

Fifth, many exchange rate reforms have been implemented. As of January 1 1994, China took a major step toward currency convertibility by unifying the official and swap market exchange rates. This was a real breakthrough in the reform of China's foreign trade system, which helped to bring China's foreign trade operations closer to international norms, playing a positive role in gaining full membership of the WTO. The measures taken included: unification of the exchange rates and adoption of a managed, market-based, uniform floating exchange rate; abolition of the retention schemes and introduction of a foreign exchange surrendering system; abolishment of the compulsory foreign exchange plan, permitting users to buy foreign exchange from designated banks on presentation of valid import documentation; termination of the issuing of Foreign Exchange Certificates (FECs) and phasing out FECs already issued; and establishment of an inter-bank foreign exchange market. The new exchange rate system has improved the efficiency of

foreign exchange allocation and strengthened the central bank's ability to stabilize the rate (e.g., Lichtenstein 2000; Lu and Zhang 2000), with a huge impact on trade.[4]

Together, by launching a series of reforms in the above five trade-related policy domains China has speeded up the pace of liberalization impressively since 1992. By now, the reform of trade policies, exchange rate regime and administrative procedures has triggered an unprecedented convergence toward international norms. Based on this observation, we selected 1993 to 1999 as the milestone period to analyze the regulation-driven changes in Chinese bilateral trade linkages (see also below). In this period, we expect the model (see below) to work, as international trade was liberalized such that the resulting changes in trade linkages could materialize. Note that trade liberalization measures are not introduced as (independent) variables in the model below, as Chinese liberalization is a continuous process that cannot be associated with clear-cut and discrete deregulatory events. Rather, we have decided to run three sets of analyses: for the whole 1993-1999 period, as well as for both milestone years 1993 and 1999 separately, In so doing, particularly by comparing the results for both benchmark observation years 1993 and 1999, we hope to be able to observe the effect of the Chinese liberalization program over time.

4.2.2 Trade partners

Ever since the trade liberalization program is in effect, an important feature of Chinese trade patterns is the increased diversity of trade partners. The number of

[4] Export grew at 20.9% in 1994 and 18.7% in 1995, whereas import increased by 31.9% in 1994 and 23.0% in 1995 (Customs General Administration of the People's Republic of China).

trade partners (representing a trade value above the one-million US dollar threshold) increased from 148 in 1990 to 183 in 1999. Additionally, the Herfindahl-Hirschman concentration index of Chinese export dropped from 0.47 in 1990 to 0.34 in 1999.[5] Hong Kong had for long been China's largest trade partner, counting for 43.2 percent of Chinese exports in 1990, but Hong Kong's share dropped to an interim low of 18.9 per cent in 1999 (IMF 1995, 2000). Besides increasing trade partner diversity, China's regional spread of trade linkages has changed along with the process of international trade liberalization. A frequently used indicator for trade linkages is the regional distribution of export and import. Of China's major trade partners, the share of the European Union, the United States, Asia (except Hong Kong and Japan) and Africa has increased, while the linkages with Hong Kong and Japan have slackened. The data in Table 4.1 substantiate, by and large, this claim by listing the export and import trade shares for eight regions.

However, as stated above, although regional trade shares are an interesting measure of trade linkages, we opt for the trade intensity index to measure the relative importance of a country or region to China's trade *vis-à-vis* the importance of the rest

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[5] The Herfindahl-Hirschman concentration index is commonly used as a measure of market structure (Daems and Douma 1989). We use this index to measure the regional concentration of Chinese export:

Herfindahl-Hirschman concentration index = $\sqrt{\sum_{i=1}^{n} \sigma^2}$,

where n denotes the number of trade partners, and σ stands for the share of export of a specific country in total export. The index is 1 if there is only one trade partner, while an index close to 0 reflects almost perfect trade diversification.

of the world. It is here where the country or region-level trade intensity index adds value (see below for a formal definition). Table 4.2 shows that the trade intensity with Asian countries is relatively high, followed by United States, the Middle East, the European Union and the Western Hemisphere (in that order).

Table 4.1 Geographical composition of Chinese export and import in 1991-1999 (%)

Region		1993	1994	1995	1996	1997	1998	1999	1993-1999
EU	Export	12.81	12.72	12.79	13.12	13.50	14.85	16.02	25.06%
	Import	14.71	16.09	16.08	14.31	14.09	14.20	16.24	10.40%
USA	Export	18.49	17.74	16.61	17.67	17.90	20.65	21.54	16.50%
	Import	10.28	12.08	12.26	11.64	11.45	12.04	11.76	14.40%
Japan	Export	17.20	17.83	19.13	20.44	17.42	16.14	16.62	-3.37%
	Import	22.37	22.77	21.96	21.02	20.37	20.16	20.38	-8.90%
Hong Kong	Export	24.05	26.75	24.20	21.78	23.96	21.08	18.93	-21.29%
	Import	10.10	8.21	6.51	5.64	4.91	4.75	4.16	-58.81%
Rest of Asia*	Export	12.75	13.55	15.80	15.52	15.64	13.42	14.23	11.61%
	Import	24.60	25.39	27.19	29.46	31.95	32.85	32.18	30.81%
Africa	Export	1.30	1.10	1.30	1.40	1.40	1.84	1.69	30.00%
	Import	0.70	0.70	1.00	1.00	1.60	1.02	1.40	100.00%
Middle East	Export	2.80	2.40	2.30	2.30	2.30	NA**	2.73	-2.50%
	Import	1.60	1.20	1.70	2.20	2.70	NA**	2.19	36.88%
Western	Export	1.70	1.90	2.00	2.00	2.40	2.81	2.56	50.59%
Hemisphere	Import	1.80	1.80	2.10	2.50	2.60	2.07	1.77	-1.67%

* Rest of Asia comprises the Asian continent except for Japan and Hong Kong.

** NA denotes not available.

Sources: IMF, Direction of Trade Statistics Yearbook, 1995 and 2000.

Table 4. 2: Trade intensities of China in 1999

Region	Export intensity	Import intensity
EU	0.44	0.42
USA	1.19	0.96
Japan	3.10	2.74
Hong Kong	6.10	1.35
Rest of Asia*	1.05	2.03
Africa	0.90	0.75
Middle East	0.98	0.71
Western Hemisphere	0.42	0.33

* Rest of Asia comprises the Asian continent except for Japan and Hong Kong.

Sources: MIF, Direction of Trade Statistics Yearbook, 2000.

4.3 Hypotheses

The hypothesized determinants of the trade intensities should be variables that influence the direction of trade flows among countries, and not so much those that affect the levels of trade in the world at large. After all, we are interested in explaining the distribution of trade flows over countries rather than the absolute trade volumes. Our first group of variables is derived from the gravity model literature. In an early contribution to the literature, Linnemann (1966) classified the factors that determine bilateral trade into three categories of variables, i.e., measures of

(1) total potential supply of the exporting country A,

(2) total potential demand of importing country B, and

(3) "resistance" to trade from potential supplier A to potential buyer B.

The first two categories of measures offer proxies for the trade potential of the countries A and B, respectively, whereas the third category captures the barriers and drivers of trade intensity between the countries A and B. As far as the third category is concerned, which is of central interest in the current study, former empirical studies introduced a series of variables that offer proxies for different kinds of inter-country distance. The key argument here is that the larger the distance between country A and B, along whatever dimension relevant for international trade, the lower their trade intensity will be. Prominent examples of such distance-related measures are (a) discriminatory trade integration, (b) geographical distance, (c) historical and political affinities, (d) cultural (dis)similarity and (e) economic structure overlap (Linnemann 1966; Yamazuwa 1971; van Beers and Linnemann 1991; Parsley and Wei 2001). In the current study, apart from these five established factors, we introduce another variable that may influence the trade intensities of China: foreign direct investment. Below, we formulate six hypotheses as to the expected effect of this set of six independent variables on the Chinese trade intensities. Note that we do not develop separate hypotheses for export *vis-à-vis* import trade intensities or for 1993 versus 1999, as the (empirical and theoretical) literature offers insufficient arguments to ground diverging predictions in either direction. So, as far as these comparisons are concerned, we let the data speak.

First, trade integration is an important issue in many parts of the world. A prominent example is the discriminatory trade bloc phenomenon. After all, a discriminatory trade bloc is an important barrier-reducing vehicle for the bloc's member states, but a similarly important barrier-increasing institution for non-member nations. According to the theory of customs unions, pioneered by Viner (1953), discriminatory trade blocs are likely to trigger trade-creation effects for the member

countries, so positively affecting the intensity of trade between member states. The other side of the coin is that non-member countries are likely to lose sales inside the bloc, suffering from trade-diversion effects. This well-established type of argument induces Hypothesis 4.1 (Foroutan 1998; Soloaga and Winters 2001).

HYPOTHESIS 4.1: The Chinese trade intensities are higher (lower) with non-member (member) countries outside (inside) the world's discriminatory trade blocs.

Second, historical and political affinities cannot be ignored in a study of international trade (Loungani 2000). For one, for obvious reasons of path dependencies, a long history of inter-country exchange is likely to introduce auto-correlation in the relevant international trade time series. Moreover, friendly political relationships among similar political regimes will benefit the bilateral trade between the countries involved through policies of preferred trade arrangements. Both mechanisms together give Hypothesis 4.2.

HYPOTHESIS 4.2: The Chinese trade intensities are higher (lower) with countries that are (not) tied to China through (a) long historical bonds or (b) political system similarities.

Third, many empirical studies have shown, in accordance with modern trade theory, that transport costs negatively influence trade flows (e.g., Geraci and Prewo 1977). The geographical distance of a country from world markets and the transportation conditions inside a country, for example, determine the transport cost level (e.g., Yu and Zietlow 1995). If transportation distance from a country to potential trade partners affects the geographical distribution of international trade, then the trade intensities are affected accordingly. This is Hypothesis 4.3.

HYPOTHESIS 4.3: The Chinese trade intensities are higher (lower) with countries that are nearby (far away) in terms of geographical distance.

Fourth, in general cultural and language affiliations can facilitate transaction efficiency and effectiveness in an uncertain environment (Rauch 2001; Wei 2000). Ethnic linkages, for example, play an important role in international business. Among the ethnic group networks active in international trade, the overseas Chinese settlements have received the most attention. Earlier studies have produced two related results that are particularly interesting in the context of this chapter: (a) the overseas Chinese networks play an important role in international trade in general (e.g., Redding 1995; Rauch and Trindade 2001); and (b) ethnic ties are a crucial stimulus for doing business with China in particular (e.g., Dixon and Newman 1998; Luo 2001). Based on these findings, we assume that the size of the Chinese immigrant population in a trade partner's society influences the bilateral trade intensity positively. This is reflected in Hypothesis 4.4.

HYPOTHESIS 4.4: The Chinese trade intensities are higher (lower) with countries that host a large (small) Chinese immigrant population.

Fifth, as stated in the introduction, many studies in the Linderian tradition have found evidence in support of the argument that inter-country similarity in terms of economic structure, particularly in terms of consumption patterns, has a positive effect on bilateral trade, especially in the developed world. The findings are not unambiguous, though, as other studies fail to support this hypothesis, particularly for the developing world (Linnemann 1966; Linnemann and van Beers 1988; Peh and Wong 1999). Here, we formulate the hypothesis in line with the original contribution of Linder (1961). This is Hypothesis 4.5.

HYPOTHESIS 4.5: The Chinese trade intensities are higher (lower) with countries that reveal (dis)similar economic structures.

Sixth, it is clear that foreign direct investment (FDI) and international trade are closely interrelated as the activities of multinational enterprises (MNEs) have distinctive effects on the structure of international trade, of both home and host countries. That is, the MNE's ability and willingness to internalize cross-border transactions affect the value-added activities both within a country and between countries (Dunning 1992). In general, the literature is unanimous about the importance of this link. However, the exact nature of the relationship between FDI and trade is a controversial issue in the international economics and business literature. This is because the relationship works out differently under different circumstances. For example, market-penetration FDI may substitute for the import from host countries, whilst factor-seeking investment may increase exports from the host nation to the home country (Root 1994). Summarizing the literature on the FDI-trade relationship, we can conclude that this relationship largely depends on (a) the types of FDI and trade being considered, (b) the nature of the internationalization strategies of the MNEs and (c) the characteristics of the industries and countries involved. So, not surprisingly, the evidence in the empirical literature is mixed. A number of studies have confirmed the idea that outward FDI and export trade are complementary activities, especially in the case of the developed world (e.g., Swedenborg 1979, 1985; Lipsey and Weiss 1981; Pearce 1990; Wei *et al.* 1999). Other work has reported that FDI and international trade are substitutes, and thus negatively related (e.g., Horst 1972). As far as China is concerned, empirical studies tend to reveal a positively significant impact of FDI inflow on China's total trade volume (e.g., Chen 1996; Sun 1999, 2001; Wei *et al.* 1999). In our context, we

take this finding as the benchmark hypothesis. That is, FDI is expected to influence the trade intensities between China and the investors' home countries positively. This produces Hypothesis 4.6.

HYPOTHESIS 4.6: The Chinese trade intensities are higher (lower) with countries that represent (not) much foreign direct investment in China.

4.4 Measures, Data and Methodologies

4.4.1 Measures

In total, we collected data on two dependent and ten independent variables. The dependent variables are the Chinese export and import trade intensities. The trade intensity index (*TI*), developed by Kojima (1968), Roemer (1976), Kunimoto (1977) and Drysdale and Garnaut (1982), measures the degree to which two countries trade more (or less, for that matter) intensively with each other than they do with the rest of the world. For export, it is defined as the ratio of a focal country *c*'s export share in total imports of another country *f* on the one hand and the percentage this country *c* represents of total exports in world trade on the other hand. For import, an equivalent ratio can be calculated. This study's dependent variables are the export trade intensity index (*exTI*) and the import trade intensity index (*imTI*). Obviously, the index is influenced by the absolute volumes of either partners' trade. The trade intensity index used here, though, measures the extent to which the trade relation (in terms of either export or import) of China, *c*, with foreign partner *f* is more close (or loose) than that with the rest of the world. The uncorrected trade intensity indices are expressed as follows:

$$exuTI_{cf} = \frac{x_{cf} / m_f}{x_c / m_w}$$
$$imuTI_{cf} = \frac{m_{cf} / x_f}{m_c / x_w} \qquad (4.1)$$

Here, $exuTI_{cf}$ is defined as the uncorrected Chinese export intensity with country f, x_{cf} is Chinese export to country f, m_f is total import of country f, x_c is Chinese total export and x_w is world export. Similarly, $imuTI_{cf}$ is defined as the uncorrected Chinese import intensity with country f, m_{cf} is Chinese import from country f, x_f is total export of country f, m_c is Chinese total import and m_w is world import. Since China cannot export to (or import from) itself, the formulas above must be modified by using overall world trade reduced by China's import (export). This gives the corrected trade intensity index (dropping the *u* in the shortcut reference)

$$exTI_{cf} = \frac{x_{cf} / m_f}{x_c /(m_w - m_c)}$$
$$imTI_{cf} = \frac{m_{cf} / x_f}{m_c /(x_w - x_c)} \qquad (4.2)$$

In this study, we use expression (4.2) to calculate the export and import *TIs*. A value of the *TI* greater than one indicates that China exports to (or imports from) country *f* more intensively than it does to (or from) the rest of the world. Vice versa: a value of *TI* less than one reflects that China exports to (or imports from) country *f* less intensively than it does to (or from) the rest of the world.

In total, we use ten independent variables. The first one relates to the issue of discriminatory trade integration (Hypothesis 4.1). We use a dummy variable labeled regional integration (*INTE*) as a proxy for the relative height of such barriers, with 0

denoting non-membership and 1 membership of a trade bloc. In 1999, four close trade blocs – the European Union (EU), the North-American Free Trade Agreement (NAFTA), the Association of Southeast Asian Nations (ASEAN) and the Latin-American MERCOSUR – are taken into account. In 1993, only the EU and the ASEAN are taken on board since at that time the other blocs were not yet mature enough.

The second pair of independent variables relates to historical and political affinities (Hypotheses 4.2a and b, respectively). Our second independent variable is the duration of diplomatic ties (*DIPLO*) and the third one relates to political system similarity (*POLI*), which together offer proxies for the historical and political affinity variables. For *DIPLO* we have calculated the duration in years after the date when China and a trade partner set up a formal diplomatic relationship; and for *POLI* we use a simple 0-1 dummy with a 0-code for capitalist countries and a 1-code for communist or transitional nations.

The transport cost variable is proxied by a straightforward indication of geographical distance (Hypothesis 4.3), which is denoted as *DIST*. This is our fourth independent variable. Considering the most popular sea-road transportation route of goods from and to China, we code border countries as 0, non-border Asian countries as 1, Oceanic countries as 2, European and Africa countries as 3, and American countries as 4. We decided to use this categorical variable rather than a capital-to-capital kilometer one (as is often done in gravity model analyses) because international trade can happen everywhere outside of the capital of a huge country like China. China's border countries are more likely to trade with Chinese border provinces than with Beijing. The geographic distance between Beijing and Hanoi is about two times that between Beijing and Ulaanbaatar, but we cannot say that South Korea is two times further away from China than Mongolia is. For this reason, we suppose that the

impact of distance on bilateral trade is the same for all border countries, no matter how far the distance between the capital cities is.

The fifth independent variable is a proxy for cultural affinity, i.e., the relative size of the Chinese immigrant population in non-Chinese countries (Hypothesis 4.4). We use the share of the Chinese immigrant community in the trade partners' population (*CHIpop*) as our cultural affinity measure.

The economic structure similarity is measured through four different proxies, which are introduced to test for the (non)existence of the Linder effect in China (Hypothesis 4.5). The sixth independent variable is gross domestic product (GDP) per capita (*PGDP*). Here we use *PGDPdif* to measure the difference, which can be expressed as $PGDPdif = (PGDPc - PGDPf)/PGDPc$, where *PGDP* is measured in PPP-price (recall that *c* denotes China and *f* the foreign trading partner). The seventh independent variable is the ratio of education expenditure to GDP (denoted as *EDUC*), which is an indicator of the level of labor cost, as well as the availability of high-skill labor or high-brow technology. Again, we calculate *EDUCdif* to measure the discrepancy between China and trade partner *f*, which is expressed as $EDUCdif = (EDUCf - EDUCc)/EDUCc$. The eighth independent variable is an industry structure measure. We use the share of services in GDP, which is denoted as *SERV%*. Among the 71 trade partners (see below), all partners have a higher *SERV%* than China, except for Cameroon and Loa. Therefore, we suppose that the higher *SERV%*, the larger the economic structure difference.[6] The ninth

[6] Another reason to use SERV% instead of a SERV%-discrepancy measure is that we conjecture that SERV% per se is positively correlated with TI. The argument is

independent variable is a measure of the similarity of the commodity composition of trade, which is labeled *COS*. *COS* was developed originally by Linnemann (1966). *COS* varies between 0 (no similarity) and 1 (perfect similarity).[7]

The tenth, and final, independent variable relates to foreign direct investment. In the post-1991 period, FDI inflow in China has increased extraordinarily, which inevitably influences China's export and import performance. In 1999, the share of foreign investment companies in Chinese total export and import were 45.5 and 51.8 per cent, respectively.[8] These figures reflect the impact of China's dual trade regime (Naughton 1996, 1999) and illustrate the important role played by FDI in China's foreign trade. Earlier studies on the FDI-trade relationship used the previous year's FDI-level, thus exploiting time-series data, as the explanatory variable (e.g., Zhang and Song 2000). Our study is different in two ways, though: (a) we focus on trade intensity instead of trade flow as the dependent variable; and (b) we use cross-sectional data for two years (1993 and 1999: see below) next to and on top of time-series information. Therefore, we start from the assumption that all the active FDI inflows affect the *TI*. Based on data availability limitations, we use the previous three years' cumulative FDI inflow as our tenth independent variable, denoted as *FDIsum*.

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that a high share of services in GDP implies an advanced services industry, which facilitates foreign trade with high-quality services products, such as transportation, telecommunication, insurance, banking and financial services.

[7] $COS = \frac{\sum_k X_{ck} * M_{fk}}{\sqrt{\sum_k X^2_{ck} * \sum_k M^2_{fk}}}$, where X_{ck} is the export volume of China in commodity class k, and M_{fk} is the import volume of China's trade partner in commodity class k.

[8] General Administration of Customs of China.

4.4.2 Data

We chose 1993 and 1999 as our two milestone observation years in order to analyze what happened to Chinese export and import trade intensities, and their underlying driving or impeding forces, in the decade of accelerated liberalization. There are two reasons to select 1993. First, the new period of intensified international trade reform started in 1992, and 1993 is the first year in which the new policies functioned. So, the great changes – if any, of course – have largely materialized in the post-1993 period.[9] By comparing the results for 1993 *vis-à-vis* 1999 we can hope to reveal the changes brought about by the continuous process of international trade reform. The other reason is related to FDI. As stated above, for year *t* we use the sum of FDI in the previous three years *t-1*, *t-2* and *t-3* as a key explanation for *TI* in year *t*. Before 1990, however, FDI inflow was consistently at a very low level. In effect, in the pre-1990 period most trade partners had no FDI in China whatsoever. Even in 1990, there were only 34 countries with a Chinese FDI level above the (very low) $10,000-threshold (MOFTEC 1990). In early 1992, Chinese government reaffirmed the open-door policy and called for a massive FDI influx into China. The FDI inflow in China in 1992 doubled the figure of 1991, and in 1993 the inflow of FDI doubled the

[9] Of course, whatever benchmark year is selected, a degree of arbitrariness is unavoidable. After all, trade-affecting events happen all the time: for example, the Tiananmen crisis in 1989, China's nuclear testing in 1995, and the bombing of the Chinese embassy in Belgrade in 1999. We do believe, however, that 1993 is a good choice. For example, the sanctions imposed after the Tiananmen crisis had been relaxed during the two years after the event, as Japan lifted the sanctions after one year and the US after 18 months. Therefore, we can safely assume that the short-term effects of the event on bilateral trade had diminished by 1993. Indeed, statistics show that bilateral trade with the Western world increased at a high speed after 1991.

figure of 1992. The number of investing countries increased to 59 in 1992 (MOFTEC). Therefore, the 1990-1992 period is the turning point that demarcates the entry from a, basically, non-FDI into a new pro-FDI epoch.

The source of the international trade data is mainly the IMF, complemented by sources from inside The Custom of People's Republic of China. In total, data for 71 trade partners are available (see the Appendix). Diplomatic data are from the Chinese Ministry of Foreign Affairs. Information about the sizes of the per-country Chinese immigrant population abroad are largely copied from the *Overseas Chinese Economy Yearbook 1990* (Poston and Yu 1991), which includes the latest census data available for most countries, complemented by figures from *The Encyclopedia of the Chinese Overseas* (Pan 1999). Data for education expenditures, GDP per capita and services industry share are collected from the Worldbank 2000 database. Finally, FDI information has been provided by MOFTEC.

The descriptive statistics are reported in Tables 4.3a, 4.3b and 4.3c (though without the *COS* variable: see below for an explanation)

Table 4.3a: Mean levels, standard deviations and correlation coefficients (1993-1999)

	Mean	s.d.	1	2	3	4	5	6	7	8	9
1 INTE	0.32	0.47	1.00								
2 DIPLO	26.24	14.16	-0.05	1.00							
3 POLI	0.17	0.38	-0.27	0.03	1.00						
4 DIST	2.38	1.36	0.14	-0.15	-0.15	1.00					
5 LogCHIpop	-3.98	3.05	0.44	-0.08	-0.30	-0.14	1.00				
6 PGDPdif	2.51	3.04	0.50	-0.06	-0.15	0.21	0.38	1.00			
7 EDUCdif	1.17	0.89	0.10	-0.11	0.07	0.26	-0.18	0.42	1.00		
8 SERV%	54.35	12.08	0.32	-0.06	-0.15	0.41	0.19	0.63	0.37	1.00	
9 FDIsum	0.0043	0.01	0.15	-0.15	-0.13	-0.15	0.34	0.42	0.05	0.21	1.00

Table 4.3b: Mean levels, standard deviations and correlation coefficients (1999)

	Mean	s.d.	1	2	3	4	5	6	7	8	9
1 INTE	0.41	0.50	1.00								
2 DIPLO	28.92	14.70	-0.09	1.00							
3 POLI	0.17	0.38	-0.37	0.04	1.00						
4 DIST	2.38	1.37	0.34	-0.16	-0.15	1.00					
5 LogCHIpop	-3.98	3.07	0.53	-0.07	-0.30	-0.14	1.00				
6 PGDPdif	1.94	2.68	0.54	-0.01	-0.17	0.20	0.38	1.00			
7 EDUCdif	1.11	0.81	0.01	-0.14	0.06	0.30	-0.20	0.39	1.00		
8 SERV%	55.76	12.89	0.35	-0.21	-0.07	0.35	0.18	0.58	0.44	1.00	
9 FDIsum	0.0055	0.02	0.16	-0.17	-0.15	-0.19	0.38	0.52	-0.01	0.22	1.00

Table 4.3c: Mean levels, standard deviations and correlation coefficients (1993)

	Mean	s.d.	1	2	3	4	5	6	7	8	9
1 INTE	0.23	0.42	1.00								
2 DIPLO	23.24	14.10	-0.04	1.00							
3 POLI	0.17	0.38	-0.24	0.03	1.00						
4 DIST	2.38	1.37	-0.03	-0.15	-0.15	1.00					
5 LogCHIpop	-3.98	3.07	0.46	-0.08	-0.30	-0.14	1.00				
6 PGDPdif	3.22	3.56	0.39	-0.04	-0.14	0.22	0.39	1.00			
7 EDUCdif	1.28	1.00	-0.06	-0.10	0.10	0.20	-0.20	0.36	1.00		
8 SERV%	54.20	11.22	0.25	-0.07	-0.23	0.46	0.23	0.75	0.33	1.00	
9 FDIsum	0.0033	0.01	0.00	-0.09	-0.11	-0.11	0.23	0.43	0.04	0.18	1.00

4.4.3 Methodologies

The empirical study starts from a general log-linear specification of an estimation model using the dependent and independent variables introduced above.[10] After various tests (available upon request), we decided to specify the basic model as follows:

$$\log TI_{cf} = \beta_0 + \beta_1 INTE + \beta_2 DIPLO + \beta_3 POLI + \beta_4 DIST + \beta_5 \log CHIpop + \beta_6 PGDPdif + \beta_7 EDUCdif + \beta_8 SERV\% + \beta_9 FDIsum + \varepsilon. \quad (4.3)$$

The following aspects about the model are worthwhile discussing.

First, we ran regressions for different model specifications. Note that the superiority of specification (4.3) above obviously offers partial evidence against Hypothesis 4.5, as the *COS* variable has dropped out. That is, the *COS* coefficient is insignificant, and the plausibility of the parameter estimates improves if *COS* is removed. This implies that inter-country export-import similarity does not contribute to the intensity of trade between China and its trade partners.

Second, we calculated the Pearson correlation coefficients among all explanatory variables of model (4.3) so as to identify possible cases of problematic multi-collinearity. The results are reproduced in Tables 4.3a, 4.3b and 4.3c above. According to the rule of thumb test, multi-collinearity is not a problem since the all the values of the correlation coefficients are below 0.7 (or above –0.7, for that matter), except for the *PGDPdif* – *SERV%* 0.75 correlation for 1993, which we tolerate as both variables are proxies for the Linder effect. Therefore, the results

[10] This is different from the usual log-log specification in gravity analyses for two reasons. First, trade intensity is a ratio rather than an absolute value dependent variable. Second, many of our independent variables can take value zero.

reported below are based on the regression model (4.3) with nine independent variables.

Third, the logarithm is taken of the Chinese immigration population share variable in trade partner countries, because we expect that the relation between the *TI* and *CHIpop* is not linear. The data reveal that the marginal increase in *TI* with respect to an increase in *CHIpop* is indeed a decreasing function of *CHIpop*. For example, the *CHIpop* of Singapore and Vietnam was 68 and 0.7 per cent in 1999, respectively, but we cannot expect the influence of *CHIpop* in Singapore to be 100 times larger than that of Vietnam.

Fourth, for the remaining discrepancy variables as to the similarity of economic structures, *EDUCdif* and *PGDPdif*, we do not take the absolute value, because we may expect different effects of positive *vis-à-vis* negative economic distance on *TI*. Although there are studies that report evidence for a Linder effect in developing countries, the GDP of the countries included in those studies were not very low compared to the developing countries' average. In effect, most studies support the hypothesis that the Linder effect exists only in countries with per-capita income above a relatively high threshold (Hanink 1990; Arnon and Weinblatt, 1998; and Chow and Kellman 1999). Estimating a simple linear regression model for the 24 countries which GDP per capita lower than China, we find a weak positive relation between export *TI* and the absolute value of both *PGDPdif* and *EDUCdif* in 1999.[11]

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[11] For the PGDPdif variable, we ran all analyses for the developed and developing countries separately, which China offering the cut-off level. This produces estimation results qualitatively similar to the ones reported below in Tables 4.4 and 4.5 for the

Therefore, we conjecture that the *PGDP* and *EDUC*-discrepancy measures are negatively related to *TI* if the trade partner's GDP per capita is higher than that of China, but positively related if the trade partner's GDP per capita is lower than that of China.[12]

Fifth, we estimate log-linear rather than linear *TI* models. The reason is that the linear models are associated with a standard residual plot that indicates the existence of non-constant variance (available upon request). If we apply a natural logarithmic transformation to the *TI* variable, then the problem of non-constant variance does not emerge. The result of White's heteroskedasticity test (available upon request) indeed reveals that heteroskedasticity plagues the linear models, but not their log-linear alternatives.

Below, we report the results of OLS-estimates[13] of the log-linear model (4.3) above for the whole 1993-1999 period, two milestone observation years (1993 and 1999), two independent variables (export and import *TI*) and 71 trade partners (see the Appendix). In so doing, 93 and 94 percent of Chinese export in 1999 and 1993,

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whole country sample. This could not be checked for the case of EDUCdif, due to the small number (five) of countries with education levels below China's.

[12] The results for different model specifications, as referred to above (available upon request), support this assumption. That is, model specification with absolute values of EDUCdif and PGDPdif produces inferior results.

[13] We did not use a fixed-effect model because three out of seven explanatory variables are time-invariant. These three variables would be swept away by a fixed-effect transformation, implying a major loss of information. A random-effect model is suitable for estimation with a huge sample. However, we only have 71 (72) cross-sectional units (i.e., countries).

respectively, and 95 and 96 percent of Chinese import in 1993 and 1999, respectively, are covered.[14]

4.5 Evidence

The regression results are presented in Tables 4.4 and 4.5. As a benchmark for the discussion of the results, Table 4.6 offers an overview of how the measures and the findings relate to the six hypotheses for the 1993-1999, 1993 and 1999 regressions, respectively.

The regression results for the whole 1993-1999 period are reported in Table 4.4. For one, the explanatory power of the export trade intensity is much larger than for import trade intensity, with an R-squared of 0.565 and of 0.254, respectively. As far as the hypotheses are concerned, the export trade intensity regression produces support for Hypotheses 4.1, 4.2a, 4.3, 4.4, 4.5a, 4.5b and 4.6, whereas the import trade intensity analysis does so for Hypotheses 4.3, 4.5c and 4.6 (with the exception of *EDUCdif* estimate, all at the 1% level of significance). Significant results with unexpected signs emerge for political system similarity in the export trade intensity regression (at the 1% significance level), and education discrepancy in the import trade intensity analysis (at the 10% level of significance). Of course, the regressions

[14] Chinese import and export here refers to the trade of mainland China with other countries, but excluding trade with Hong Kong, Macao and Taiwan. By not covering all export and import flows, we avoid another econometric pitfall (because otherwise the TIs would sum up to one). Additionally, we decided not to include Hong Kong in our analyses because this 'special' part of China introduces much noise as a result of re-export and re-investment distortions (Fung 1998; Fung and Lau 2001).

for the pooled 1993-1999 data may mask underlying processes of change that emerge gradually over time. This is why we, in addition, report results for both milestone years 1993 and 1999 separately, in reverse order of chronology, before we move to the interpretation of our findings.

Table 4.4: Empirical results for Chinese bilateral trade intensity in 1993 to 1999

	Log(exTI)	Log(imTI)
Intercept	0.441 (2.758)	0.869 (2.328)
INTE	-0.403*** (-5.699)	0.201 (1.220)
DIPLO	0.010*** (5.365)	0.004 (0.970)
POLI	-0.323*** (-4.195)	-0.175 (-0.970)
DIST	-0.257*** (-10.895)	-0.455*** (-8.233)
LogCHIpop	0.042*** (3.701)	0.006 (-0.208)
PGDPdif	-0.083*** (-5.717)	0.029 (0.847)
EDUCdif	-0.073** (-1.990)	0.178* (2.085)
SERV%	-0.002 (-0.729)	-0.024*** (-3.337)
FDIsum	20.297*** (9.000)	19.231*** (3.654)
N	497	497
R-squared	0.565	0.254
F	70.327***	18.342***
P-value	0	0

Notes: * p≤0.1. ** p<0.05. *** p<0.01; and values in parentheses are t-statistics.

Table 4.5: Empirical results for Chinese bilateral trade intensity in 1993 *vis-à-vis* 1999

	1999		1993	
	Log(exTI)	Log(imTI)	Log(exTI)	Log(imTI)
Intercept	0.042 (0.086)	1.337 (1.547)	0.794 (0.902)	-0.933 (-0.775)
INTE	-0.607*** (-2.678)	0.022 (0.055)	-0.489 (-1.416)	0.058 (0.123)
DIPLO	0.009 (1.602)	0.007 (0.752)	0.022** (2.569)	0.015 (1.313)
POLI	-0.522** (-2.481)	-0.771** (-2.058)	-0.546 (-1.592)	0.800* (1.705)
DIST	-0.171*** (-2.566)	-0.420*** (-3.525)	-0.362*** (-3.453)	-0.485*** (-3.383)
LogCHIpop	0.057* (1.746)	0.081 (1.392)	0.052 (1.047)	-0.018 (-0.258)
PGDPdif	-0.110** (-2.236)	-0.090 (-1.031)	-0.069 (-1.049)	0.012 (0.129)
EDUCdif	-0.279** (-2.402)	0.443** (2.140)	-0.036 (-0.257)	0.028 (0.149)
SERV%	0.013 (1.525)	-0.025* -1.718	-0.010 (-0.525)	0.008 (0.339)
FDIsum	15.196*** (2.530)	18.155* (1.696)	19.976* (1.891)	15.655 (1.084)
N	71	71	71	71
R-squared	0.593	0.425	0.468	0.303
F	9.855***	5.00***	5.967***	2.941***
P-value	3.4E-09	4.77E-05	5.96E-06	5.78E-03

Notes: * $p \leq 0.1$. ** $p<0.05$. *** $p<0.01$; and values in parentheses are t-statistics.

Table 4.6: An overview

HYPOTHESES (variable code: expected effect)	Export TI 1993-1999	Import TI 1993-1999	Export TI 1993	Import TI 1993	Export TI 1999	Import TI 1999
4.1: Discriminatory trade blocs (*INTE*: -)	Negative	Insignificant	Insignificant	Insignificant	Negative	Insignificant
4.2a: Historical bonds (*DIPLO*: +)	Positive	Insignificant	Positive	Insignificant	Insignificant	Insignificant
4.2b: Political system similarities (*POLI*: +)	Negative	Insignificant	Insignificant	Positive	Negative	Negative
4.3: Geographical distance (*DIST*: -)	Negative	Negative	Negative	Negative	Negative	Negative
4.4: Chinese immigrant population (*logCHIpop*: +)	Positive	Insignificant	Insignificant	Insignificant	Positive	Insignificant
4.5a: GDP discrepancy (*PGDPdif*: -)	Negative	Insignificant	Insignificant	Insignificant	Negative	Insignificant
4.5b: Education discrepancy (*EDUCdif*: -)	Negative	Positive	Insignificant	Insignificant	Negative	Positive
4.5c: Services industry share (*SERV%*: -)	Insignificant	Negative	Insignificant	Insignificant	Insignificant	Negative
4.6: Foreign direct investment (*FDIsum*: +) R-squared	Positive 0.57	Positive 0.25	Positive 0.47	Insignificant 0.30	Positive 0.59	Positive 0.43

For the regression with the export trade intensity, log (*exTI*), for 1999, the F-statistic (F = 9.855) is significant at the 1% level (with a p-value of 3.4E-09), producing an R-squared of 0.593. *INTE* is significant at the 1% level, negatively influencing *TI*. This result strongly supports Hypothesis 4.1. The *DIPLO*-coefficient turns out to be insignificant, which is not in line with Hypothesis 4.2a. *POLI* is negatively significant at the 5% level, which is contrary to our expectation in Hypothesis 4.2b. An interpretation of this result may refer to the set of trading partners. Only twelve trading partners are transitional countries. Among the twelve transitional countries, nine are from Eastern Europe, two from Middle Asia and one from Southeast Asia. As a result of European economic and political dynamics, the nine East-European countries integrate rapidly into Western Europe (Drabek and Smith 1995; Festoc 1997; Liargovas and Papazoglou 1999). This biased economic orientation is likely to produce the low export *TI* with China. *DIST* is negatively significant at the 1% level, which is in line with Hypothesis 4.3. The *logCHIpop*-coefficient is positively significant at the 10% level. This finding offers support for Hypothesis 4.4, although the low coefficient value of *logCHIpop* (0.057) indicates this element is not that important in explaining the Chinese export *TI*. *EDUCdif* and *PGDPdif* are both negatively significant at the 5% level, which offers evidence in favor of Hypothesis 4.5. *SERV%*, however, does not reach significance, which implies a failure to support Hypothesis 4.5. Perhaps, this is so because the value of *SERV%* of a country x does not differ across its trade partners, implying that this variable has an effect on the scale of trade only, and not on the trade distribution. Overall, Hypothesis 4.5 is associated with mixed evidence. *FDIsum* clearly turns out to be a significant factor, positively influencing the Chinese export *TI* at the 1% level. The coefficient of *FDIsum* is as large as 15.196, which may indicate that FDI plays a

very important role in increasing the Chinese export *TI*. This result strongly supports Hypothesis 4.6.

The estimation of the model with the Chinese import trade intensities, *log(imTI)*, in 1999 is associated with a significant F-test (F = 5.00), too, again at the 1% level (the p-value is 4.77E-05). The R-squared is much lower, though (0.425). *INTE*, *DIPLO*, *logCHIpop* and *GDPdif* turn out to be insignificant, which fails to produce (partial) support for Hypotheses 4.1, 4.2a, 4.4 and 4.5. *DIST* is negatively significant at the 1% level, *POLI* is negatively significant at the 5% level, SERV% is negatively significant at the 10% level and *FDIsum* is positively significant at the 10% level, offering (partial) support for Hypotheses 4.3, 4.2b, 4.5 and 4.6, respectively. In contrast with the expectation reflected in Hypothesis 4.5, *EDUCdif* is positively significant at the 5% level. The latter result may reflect international industry specialization along the lines of the traditional theory of comparative advantage, implying that low-wage and low-skill countries (such as China) are forced to import advanced products from high-wage and high-skill trading partners.

Comparing the import *TI* with the export *TI* results for 1999 reveals a large number of interesting differences:

a) Discriminatory trade bloc membership has a (negative) effect on the export trade intensity with China, but does not influence the import trade intensity.

b) Geographical distance plays a much more prominent (negative) role in determining import trade intensity than in explaining export trade intensity.

c) Chinese immigrant population share does (positively) influence the export trade intensity with China, but leaves the import trade intensity unaffected.

d) GDP discrepancy only (negatively) influences a trade partner's export trade intensity with China, having no impact on the import trade intensity.

e) Education discrepancy has a negative impact on export trade intensity, but a positive influence on import trade intensity.

f) China imports more intensively from countries with low services industry shares than from countries with large services industry shares, whereas an export effect is absent.

g) Although FDI is important throughout, MNE behavior has a stronger impact on export than on import trade intensities.

h) Overall, the explanatory power of the model is much larger for export than for import trade intensities.

For both model estimates for 1993, the F-statistics (F = 5.967 for export trade intensity, and F= 2.941 for import trade intensity) are significant at the 1% level. The R-squares of the 1993 regressions are substantially lower than of the 1999 regressions (0.468 for import intensity and 0.303 for import intensity). At the level of the independent variables, the results for 1993 are very different from those for 1999. In the export trade intensity regression, only the *DIPLO*, *DIST* and *FDIsum* estimates reach significance, the direction of the effects being in accordance with the Hypotheses 4.2a, 4.3 and 4.6, respectively. In the import trade intensity regression, only the *POLI* and *DIST* coefficients are (positively and negatively) significant, supporting Hypotheses 4.2b and 4.3, respectively. A comparison of the results for 1993 *vis-à-vis* 1999, produces a number of additional insights:

i) Political factors (diplomatic ties and political regimes) affect trade intensities positively and significantly in 1993 (for export and import, respectively), but not at all in 1999. In contrast, political system similarity is negatively associated with export and import trade intensities in 1999.

j) From the list of economic variables, apart from geographical distance, only FDI (positively) influences the (export) trade intensities significantly in 1993.

k) The political determinants of trade intensities that were still very important in 1993, have been moved to the background by economic explanations in 1999.

l) The explanatory power of the models is much larger for 1999 than for 1993, both in terms of export and import trade intensities.

Overall, the findings suggest two main conclusions. First, from the angle of comparing the export versus the import *TI* regressions, it becomes clear that the model is much better in explaining export than import trade intensities. This is true in terms of both overall explanatory power as well as variable-level results. Second, the 1993-1999 comparison reveals that the economic effect of China's market-oriented reform needed time to materialize after the trade liberalization measures were launched in the beginning of the 1990s. In this context, the shift from political to economic drivers of trade diversity speaks a telling tale. Many of these underlying shifts in trade-determining forces were masked in the pooled 1993-1999 analyses.

4.6 Conclusion

Since 1992, the Chinese government has strengthened the program of market-oriented reform, which resulted in major changes in the pattern of bilateral trade linkages. Here, increased trade partner diversity stands out as an important shift in

China's presence in the global market place. In terms of their share of foreign trade, not taking account of Hong Kong and Japan, the importance of non-Asian regions is increasing. In 1990, the two largest non-Asian trade partners, the European Union and the United States, accounted for 18.4 per cent of total Chinese export. In 1999, their joint share has increased to 37.6 per cent (IMF 1997, 2000). This shift in China's trade distribution in the outward-oriented 1990s is much more in line with the important position of these two traders in the world market than in the 'old' days of inward-oriented Communism. In terms of trade intensity, however, there is still a long way to go. After all, even in 1990, the trade intensity with the United States is not high compared with Asian countries, whilst the trade intensity with the European Union still is very low.

The regression analyses unravel the factors that influence the trade intensities, as well as the changes brought about by the reform program in the 1990s. In this context, without any pretention of being complete, we would like to emphasize three conclusions. First, after seven years of further reform, the economic drivers of trade intensities have gained momentum. This confirms the common sense belief that China is integrating rapidly into the world market, and that the market mechanism is starting to work properly in the area of Chinese foreign trade. In 1993, the dominant factors affecting trade intensities were still geographical and political distance. But in 1999, next to the geographical distance, a number of key economic elements do indeed influence bilateral trade linkages, pushing the role of political affinities to the background. An interesting example here is the positive effect of a trade partner's Chinese immigrant population on export trade intensity (but not on import trade intensity!). Apparently, as the Chinese economy was opening up to the world market,

the slumbering potential of ethnic ties could be activated such that the overseas Chinese communities came in use as a foothold for entry into foreign markets.

Second, comparing the findings for the export and import trade intensities, economic factors appear to be, by and large, more influential in the export than in the import domain. This suggests that export activities depend more on the characteristics of trade partners than import does. An illustrative example is the impact of FDI. FDI is related more significantly to export than to import trade intensities. This is likely to reflect the effect of different Chinese FDI policies, with an overall bias toward stimulating export-oriented FDI. That is, export-oriented foreign investments were (and still are) highly encouraged by the Chinese government through special tax rebates, low land-usage fees, and offering water, electricity and other infrastructure services. For sure, FDI can also impact upon import activities, which is reflected in the regression results as well. For instance, many MNEs in low-skill host countries tend to import high-tech equipment and material from their high-skill home regions. In this context, the Chinese government introduced preferential regulations for MNEs that import advanced equipment and ditto materials, which cannot be produced in China. Examples of such measures are the "Detailed Regulations on the Management of Import by Foreign Investment Enterprises" (June 9 1995 MOFTEC) and the "Notices on Import Tariff Policy for Further Encouraging FDI" (September 1 1999, MOFTEC). But foreign enterprises still have to face not only tariff and non-tariff barriers, but also the complicated formalities that come with import activities. Probably, this is one reason why FDI does influence import trade intensity less significantly than export trade intensity. Another case in point is the diverging results for the impact of a trade partner's membership of a discriminatory trade bloc. The discriminatory trade bloc barrier strongly influences Chinese export to member nations, but not so import from those

countries. This implies that regional integration elsewhere in the world offers a big challenge to Chinese export activities.

Third, the results of the regression analyses for 1999 and the pooled 1993-1999 period suggest that the Linder effect does indeed exist in a transitional country like China, especially in the export domain, for trade partners with higher GDP per capita than China. Take the results for the education discrepancy measure. *EDUCdif* is an indicator of labor cost and technology skill differences. Our findings reveal that the higher the education discrepancy, the lower is the export trade intensity. Similarly, the higher the discrepancy in terms of GDP per capita, the lower is the export trade intensity. For China, this means that export activities to developing countries are more intensive than the export linkages with the developed world. But for import, the Linder effect is very weak. That is, importing from countries with high education expenditures is more intensive than importing from countries with low education expenditures. This evidence supports the idea that developing and transitional countries, like China, need to import technology-intensive products from developed countries. As a Linder effect is absent in 1993, this observation only holds true for countries that have entered into the international trade arena by launching a liberalization reform program that stimulates a convergence toward international standards.

Of course, the current study is characterized by a number of limitations that point the way to future work. Here, we would like to offer two suggestions. First, future research might focus on a lower level of aggregation. That is, a breakdown of international trade flows by industry offers additional research opportunities. After all, since the elasticities of supply and demand might differ widely across industries, the response to international trade barriers may vary substantially across industries,

too (Learner and Bowen 1981). Therefore, a follow-up study could investigate the impact of industry-specific characteristics on trade linkages, so figuring out the factors that influence the (export and import) trade intensities in different industries, in and over time. Second, given the key role of FDI, future research might seek to unravel the underlying impact of the FDI pattern and MNE behavior. That is, how does FDI in China affect international trade at the level of different firms and different industries, and how is this related to home and host country features?

APPENDIX: List of countries

Asia (19): Japan, Cambodia, India, Indonesia, Korea, Loa, Malaysia, Nepal, Pakistan, Philippines, Singapore, Sri Lanka, Thailand, Vietnam, Kazakhstan, Uzbekistan, Iran, Jordan and Yemen.
Americas (12): The United States, Canada, Argentina, Brazil, Chile, Colombia, Costa Rica, Ecuador, Jamaica, Mexico, Paraguay and Uruguay.
Oceania (2): Australia and New Zealand.
Europe (24): Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, the Netherlands, Norway, Portugal, Spain, Sweden, the United Kingdom, Bulgaria, Czech Republic, Hungary, Poland, Romania, Russia, Slovenia, Turkey and Ukraine.
Africa (14): Angola, Cameroon, Congo, Cote d'Ivoire, Ghana, Guinea, Madagascar, Mauritius, Morocco, South Africa, Tanzania, Tunisia, Zimbabwe and Egypt.